U. S. FOREST SERVICE

RESEARCH NOTE LS-42

KE STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Growing White Pines to Avoid Blister Rust — New Information for 1964

This Note updates control information in Station Paper No. 92[1] by providing improved pictures for canker identification (figs. 1, 2), a revised map for determining the intensity of control required in various parts of the Lake States (fig. 3), and some guides for identifying ribes bushes (fig. 4).

Literature on blister rust control in the past has stressed the great loss of unprotected white pine to the blister rust disease. Increased knowledge of the disease has permitted a shift in emphasis, stressing that many trees can survive blister rust attack and grow to saw-log size. In Zones 1 and 2 (fig. 3) enough pines will usually survive in an acre of plantation to give a commercial stand of pine even without control. In Zone 3 surviving pines would provide an important part of the mature crop mixture. Even in parts of Zone 4, some pine will survive without control.

Zone 3 is the area where ribes eradication is most important. In much of Zone 4, long-distance spread reduces the effectiveness of control by ribes eradication. Perhaps eradicant fungicides, now being tested, can kill established cankers. But for the difficult areas of Zone 4, I feel the most effective blister rust control is the use of the trees resistant to blister rust infection that are being developed at the University of Wisconsin. They are not yet ready for release.

Reducing Rust Damage by Silviculture

Four general principles of white pine culture will help hold rust damage to a minimum:

1. *Maintain a closed canopy.* Grow pines close together so branches soon touch and maintain a uniform closed canopy. This keeps the air dry below the canopy.

2. *Prune off lower branches.* Start pruning 2 years after planting. Cut out cankered leaders so that a side branch can take leadership. Keep the lower third of the crop trees free of branches by pruning. Branches near the ground are more likely to become infected because it is wetter there.[2]

3. *Avoid small openings.* Openings in the crown canopy with a diameter less than the height of surrounding trees are cold and wet. This favors blister rust infection. Do not plant pines there.

4. *Maintain an overstory cover* of thin-crowned species in Zones 3 and 4. White pine usually grows well if brush is kept down; lack of moisture reduces rust.

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FIGURE 1. — First visible symptoms of a blister rust canker (in circle). Needles persist where fungus threads from the entrance point in the needle hold them to the twig. Canker color is light yellow-orange.

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1 *Van Arsdel, Eugene P. Growing white pine in the Lake States to avoid blister rust. U.S. Forest Serv., Lake States Forest Expt. Sta., Sta. Paper 92, 11 pp., illus. 1961.*

2 *Weber, Ray. Early pruning reduces blister rust mortality in white pine plantations. U.S. Forest Serv. Res. Note LS-38, 2 pp., illus. Lake States Forest Expt. Sta., St. Paul, Minn. 1964.*

MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

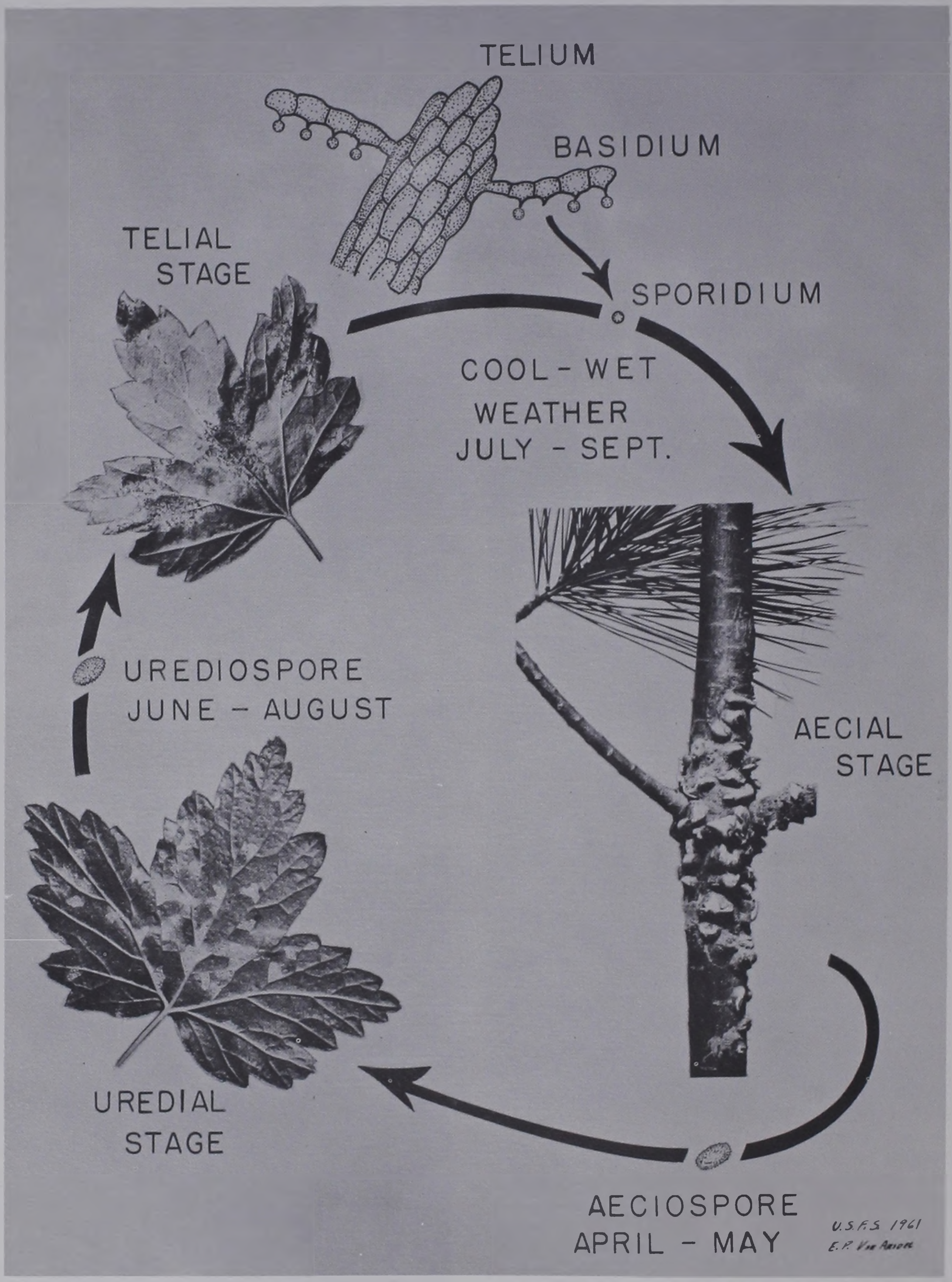


FIGURE 2. — Life cycle of the rust fungus showing typical signs on white pine and *Ribes nigrum*.

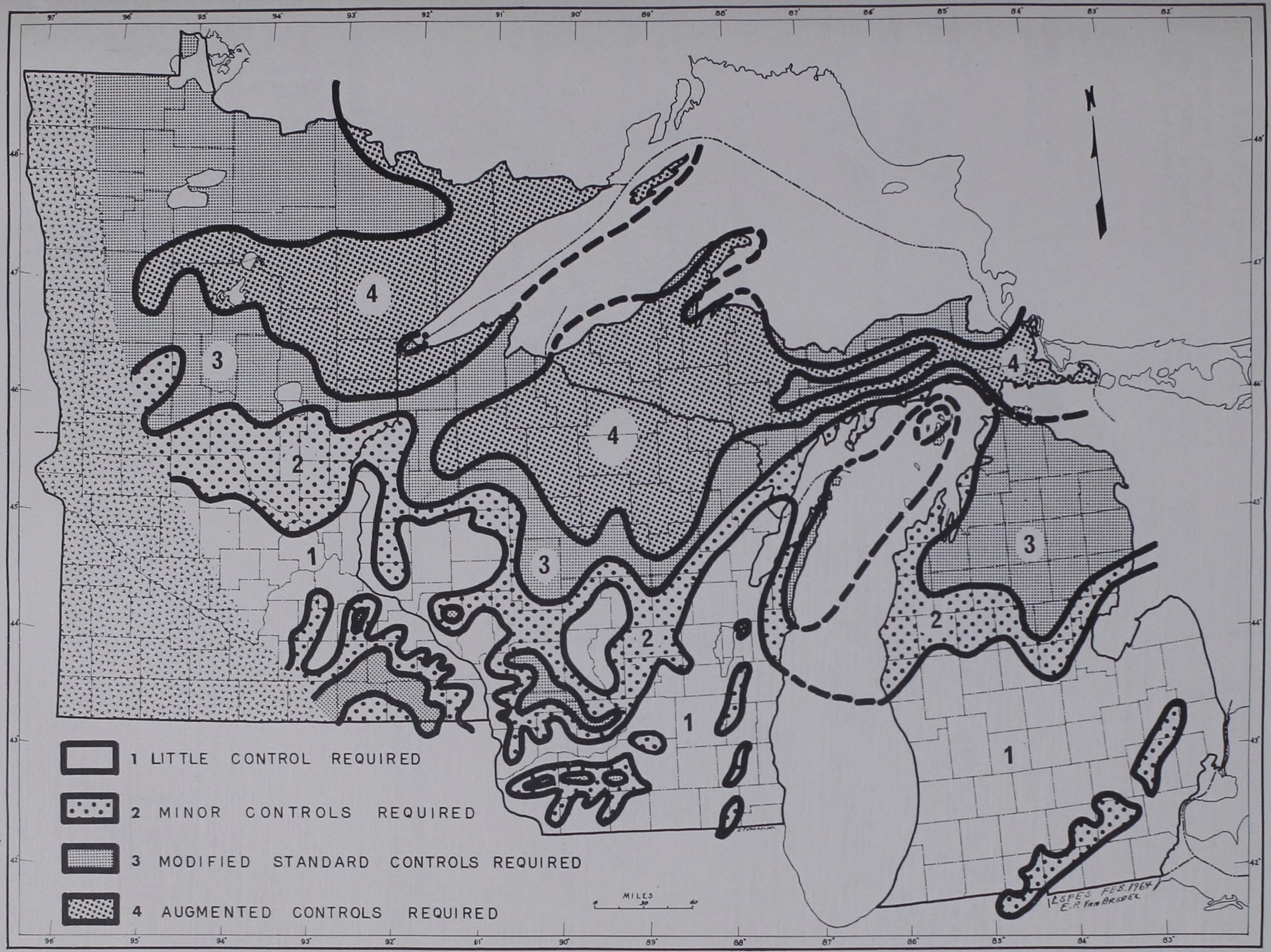
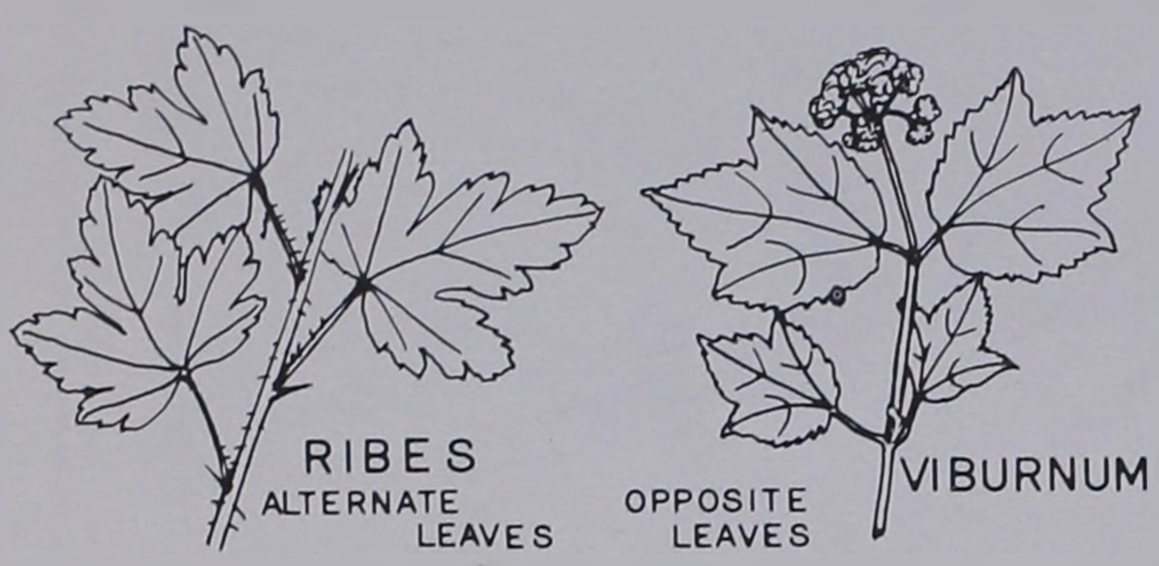


FIGURE 3. — Revised map showing climatic zones of rust infection potential.

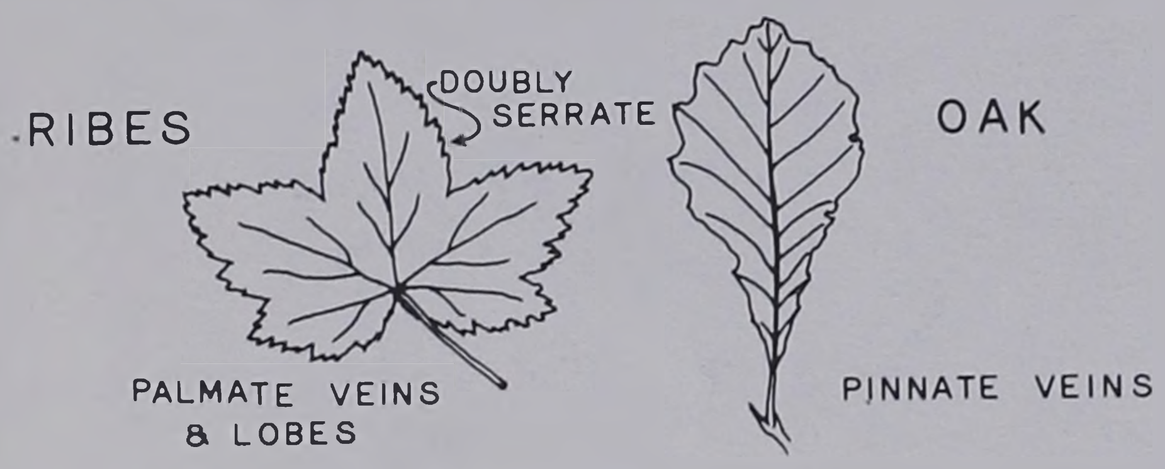
What Ribes Look Like

Some characteristics that separate ribes from other plants are presented below because this information is not readily available elsewhere.

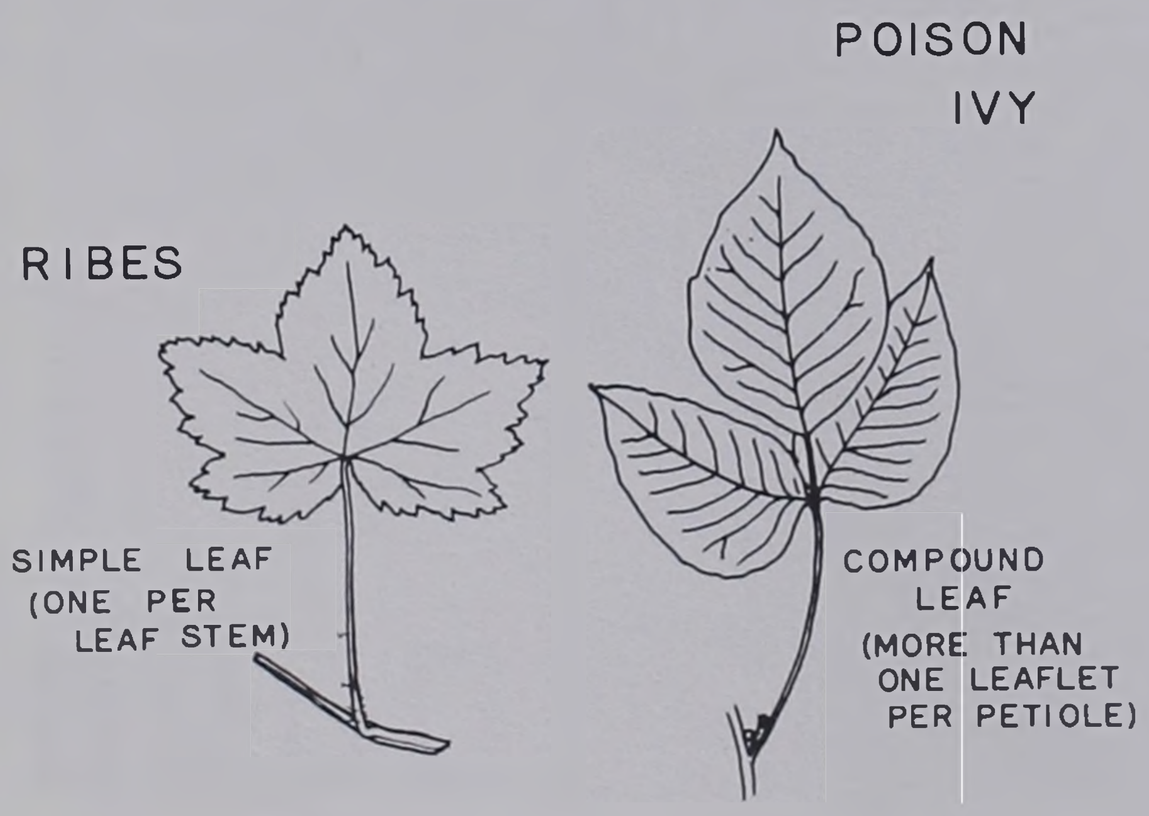
Ribes (gooseberries and currants) are shrubs up to 10 feet tall. Many kinds are thorny or prickly. Ribes leaves are always alternate on the stem; some look-alikes, such as maple, have opposite leaves.



Ribes leaves are palmately veined, palmately lobed, and have saw-toothed edges.

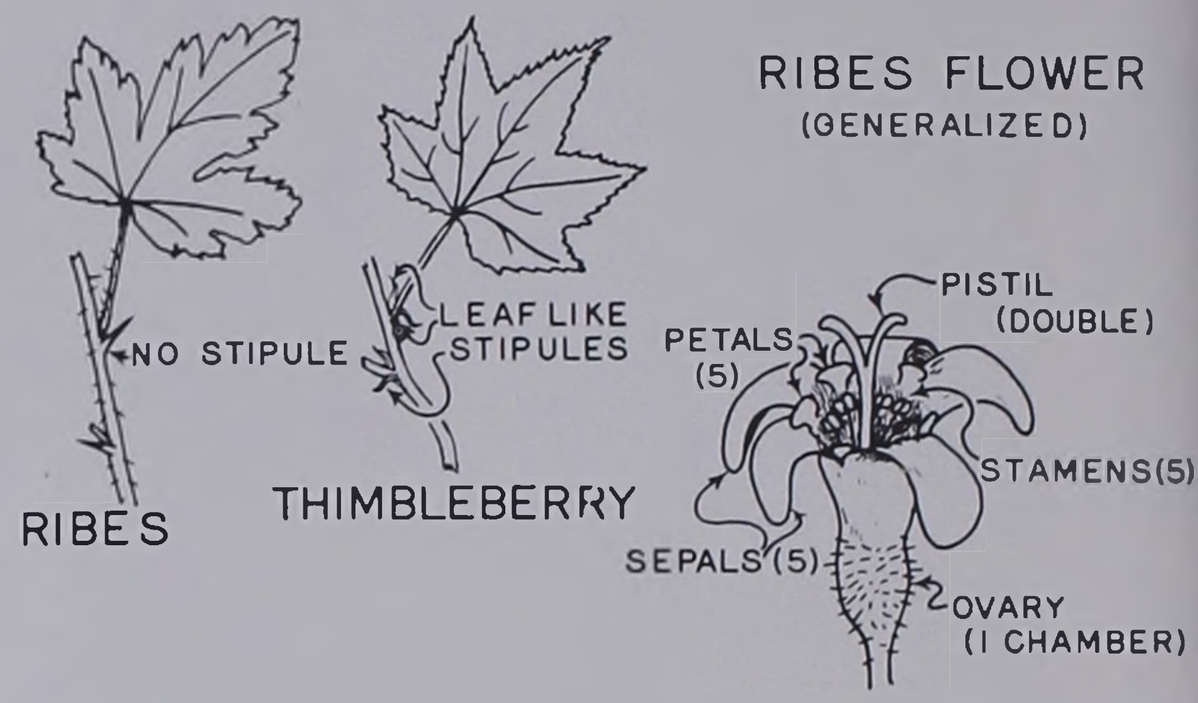


Ribes leaves always have one leaf on a leaf stem, unlike roses or raspberries which have many.

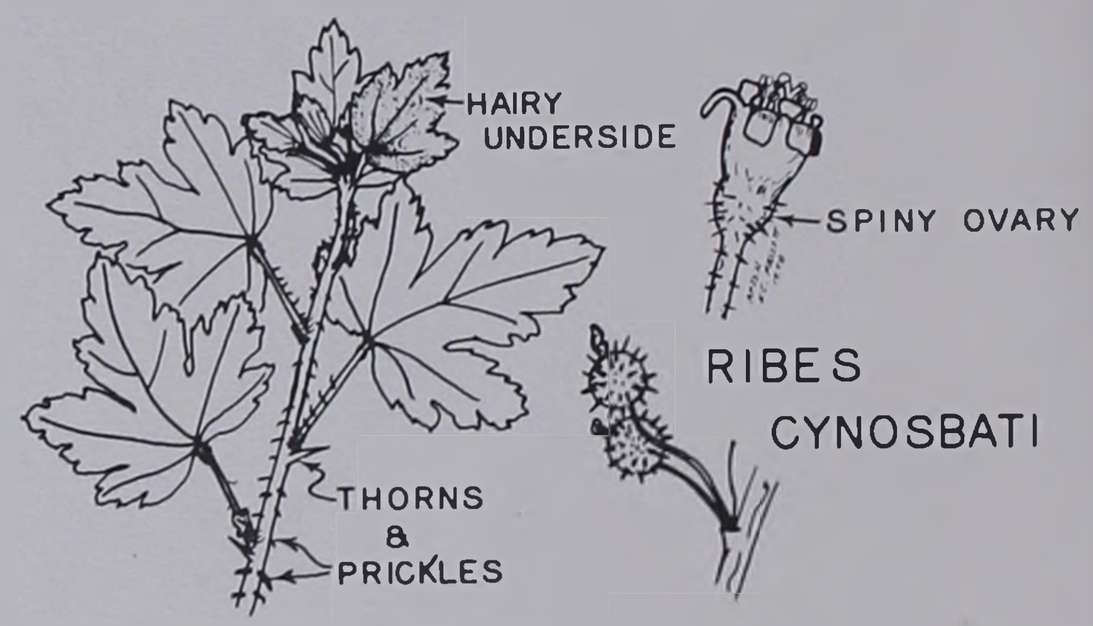


Ribes never have little leaf-like growths (stipules) at the base of the leaf stem, as do the thimbleberry and ninebark which look much like ribes.

Ribes flowers have five petals, five sepals, five stamens, and a one-chambered ovary with a double style. The withered flowers remain attached to the berry as it ripens.



A typical gooseberry is *Ribes cynosbati.*



A typical currant is *Ribes americanum.*

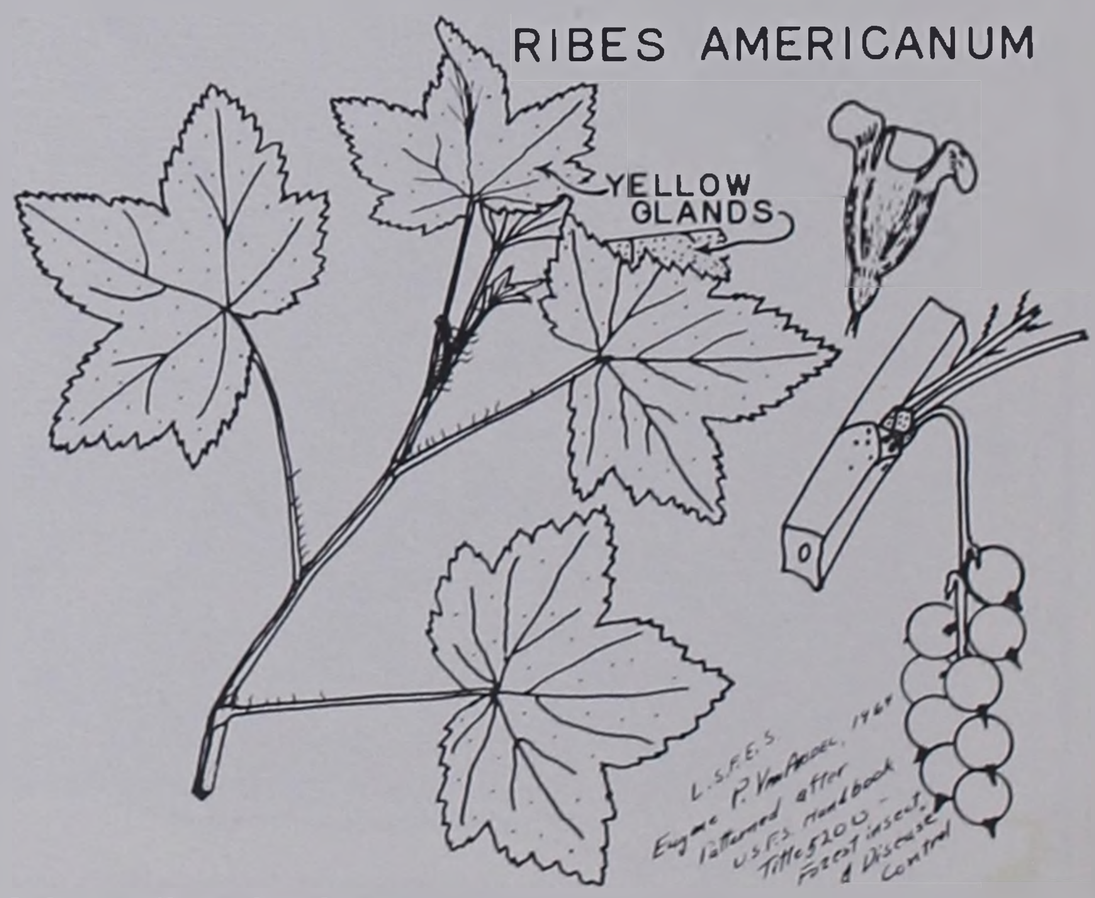


FIGURE 4. — Guide for identifying ribes bushes.